Integration of multiple criteria: lexicographic and constrained maximal principles

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Abstract

Under a very abstract setting, which includes a wide variety of economic problems, we propose two representative principles for the integration of two criteria for decision making, where a pair of criteria is given and a criterion is prior to the other. The first principle is called the *lexicographic maximal principle*, which achieves the set of maximal elements with respect to the binary relation induced by applying two criteria lexicographically. The second notion, called the *constrained maximal principle*, first excludes the alternatives which are dominated by some other alternative in terms of the prioritized criterion, and second finds the set of maximal elements in terms of the unprioritized criterion among the remaining alternatives.

Our motivation is to investigate general properties of the two principles. The two principles can be equal although they are not in general. We first provide sufficient conditions for their equivalence. Each notion of maximality has two subordinate types according to which criterion is prioritized. We second analyze under what conditions their two subordinate types are invariant. We also discuss the non-emptiness of the sets achieved by the two principles. Finally, we consider classical divisible goods allocation problems as an application of our results.

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